

### **REMARKS**

Reconsideration and withdrawal of the rejections of the claims, in view of the amendments and remarks presented herein, is respectfully requested. Claims 1-4, 8-10 and 30-37 are amended, claims 5-7 and 11-29 are canceled, and claim 38 is withdrawn. As a result, claims 1-4, 8-10 and 30-37 are now pending in this application.

The amendments to claims 1-4, 8-10 and 30-37 are made to clarify the claims, and are not intended to limit the scope of equivalents to which any claim element may be entitled. No new matter has been added.

The title has been amended as suggested by the Examiner at page 2 of the Office Action.

#### **The 35 U.S.C. § 112, second paragraph, Rejection of the Claims**

The Examiner rejected claims 1-13 and 30-37 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The cancellation of claims 5-7 renders this rejection of claims 5-7 moot. Claims 1-4 and 7 have been amended as suggested by the Examiner at pages 3-4 of the Office Action, which amendments overcome the 35 U.S.C. § 112, second paragraph, rejection of claims.

Withdrawal of the 35 U.S.C. § 112, second paragraph, rejection is therefore respectfully requested.

#### **The 35 U.S.C. §112, first paragraph, Rejections of the Claims**

##### **The Written Description Rejection of claims 1, 4-7, and 11-13**

The Examiner rejected claims 1, 4-7, and 11-13 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Claims 5-7 and 11-13 are cancelled, rendering this rejection of claims 5-7 and 11-13 moot. In particular, the Examiner asserts that claimed dioxygenase complex can comprise “any” alpha subunit. In addition, the Examiner

asserts that the genus of complexes claimed encompasses an extremely large number of difference species due to the extremely large number of aromatic compounds which can be oxidized by those complexes. As this rejection may be maintained with respect to the pending claims, it is respectfully traversed.

Possession of a claimed invention may be shown through disclosure of relevant, identifying characteristics, *i.e.*, structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics. Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112, ¶1, “Written Description” Requirement, Federal Register, 66, 1099, 1106 (January 5, 2001). Further, the written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice . . . or by disclosure of relevant, identifying characteristics, *i.e.*, structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show the applicant was in possession of the claimed genus. *Id.*

As amended, the claims are directed to a dioxygenase complex comprising a plurality of polypeptides, wherein the complex catalyzes oxidation of an aromatic substrate and comprises at least one alpha-subunit polypeptide that is SEQ ID NO:26 and further comprises: 1) a substituted amino acid at a position corresponding to position 352 of SEQ ID NO: 26, 2) a substituted amino acid at a position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 of SEQ ID NO: 26, or 3) a substituted amino acid at the position corresponding to position 352 of SEQ ID NO:26, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 of SEQ ID NO: 26, or 4) a fragment of any of 1-4 that catalyzes oxidation of an aromatic substrate.

The Examiner is respectfully requested to consider that, as amended, Applicants’ pending claims are not directed to any dioxygenase complex comprising “any” alpha subunit, but to those comprising an alpha subunit that is SEQ ID NO:26. Moreover, Applicants have provide numerous examples of types of aromatic substrates that might be oxidized by the dioxygenase complexes of the pending claims. For example, it is disclosed that the dioxygenase complexes of

the present invention catalyze those reactions that are catalyzed by naphthalene dioxygenase (NDO) or a NDO related polypeptide (exemplars of the latter are disclosed at page 11, lines 1-4 of the specification). For example, a dioxygenase complex of the present invention can oxidize an aromatic substrate to give the corresponding dihydrodihydroxy compound (*e.g.* the oxidation of biphenyl or phenanthrene to 3,4-dihydroxy-3,4-dihydrobiphenyl or 1,2-dihydroxy-1,2-dihydrophenanthrene, respectively) (page 11, lines 10-15). Furthermore, in addition to catalyzing the oxidation of naphthalene, it is disclosed that the dioxygenase complexes of the present invention catalyze the dioxygenation of a variety of multicyclic and heterocyclic aromatic compounds such as indene, 1,2-dihydronaphthalene, benzocyclohept-1-ene, anthracene, phenanthrene, dibenzo[1,4]dioxan, acenaphthylene, 1- and 2-substituted naphthalenes, biphenyl, fluorene, dibenzofuran, dibenzothiophene, 9,10-dihydroanthracene, and 9,10-dihydrophenanthrene (page 18, lines 5-14). Thus, adequate description of the structure and function of the claimed dioxygenase complex is specifically taught by the specification. Therefore, Applicants have provided adequate written description for the pending claims.

Withdrawal of the 35 U.S.C. § 112, first paragraph (written description) rejection is therefore respectfully requested.

#### The Enablement Rejection of claims 1, 4 and 11-13

The Examiner rejected claims 1,4 and 11-13 as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 11-13 are cancelled, rendering this rejection of these claims moot. As this rejection may be maintained with respect to the pending claims, it is respectfully traversed.

As evidence that Applicants' invention is enabled, the Examiner is respectfully requested to consider Applicants' detailed description. To produce a dioxygenase complex comprising a plurality of polypeptides, wherein the complex catalyzes oxidation of an aromatic substrate and comprises at least one alpha-subunit polypeptide that is SEQ ID NO:26 and further comprises: 1) a substituted amino acid at a position corresponding to position 352 of SEQ ID NO: 26, 2) a substituted amino acid at a position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 of SEQ ID NO: 26, or 3) a substituted amino acid at the position corresponding to

position 352 of SEQ ID NO:26, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 of SEQ ID NO: 26, or 4) a fragment of any of 1-4 that catalyzes oxidation of an aromatic substrate, Applicants disclose that mutagenesis of SEQ ID NO:26 can be conducted, *e.g.*, by site-directed mutagenesis (see, for example, Examples 1 and 6). To determine if the resulting dioxygenase complex catalyzes the oxidation of an aromatic substrate, Applicants disclose that, for example, biotransformation assays can be conducted, and that the biotransformation product can be analyzed by thin-layer chromatography, high-performance liquid chromatography and/or gas chromatography-mass spectrometry (Example 2).

Therefore, it is respectfully submitted that the pending claims are in conformance with 35 U.S.C. § 112, first paragraph (enablement). Thus, withdrawal of the rejection of the claims under 35 U.S.C. § 112, first paragraph, is respectfully requested.

Conclusion

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicants' attorney (612) 371-2106 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 17 day of November, 2003

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